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SHAPE OPTIMIZATION TO SOLVE INVERSE PROBLEMS AND CURVE/MODEL FITTING PROBLEMS

ABSTRACT OF THE DISCLOSURE

A method for solving deconvolution problems where it is desired to reconstruct a signal over a time range or another variable of interest involves comparing shapes of measured and reconstructed plots. The optimization method is based on minimizing the error in shape (as opposed to the square errors in amplitude). A shape approach method characterizes similarity of two functions by computing the angle between the two when they are treated as two vectors in the n dimensional space where n is the number of data points it is desired to consider from both functions (the functions themselves may consist of more than n data points). A new approximation is then created by trying to decrease the disimilarity between the actual and predicted functions. This dissimilarity is measured as the angle between the two corresponding vectors, so the measure of dissimilarity is the size of the angle. A much closer matching between the reconstructed plot and what may be expected in practice is achieved with this method than is conventionally achieved with least squares or Fourier transform methods.